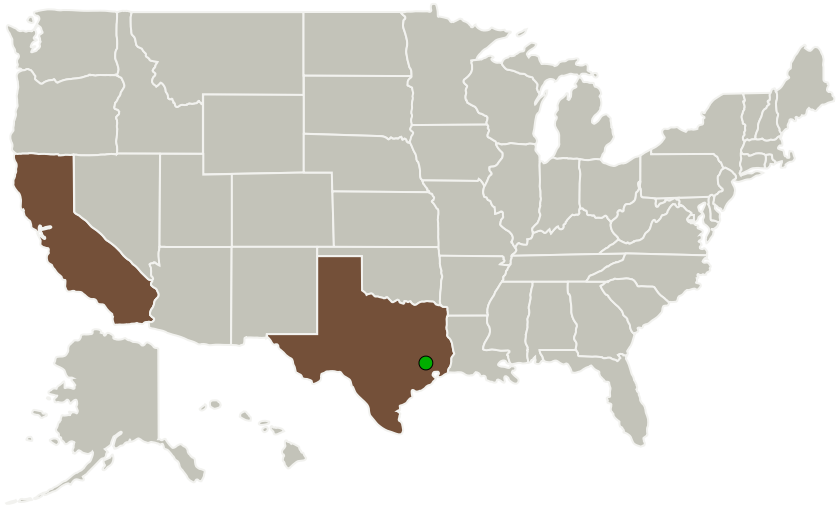
Wearable Device for Objective Sleep Monitoring, Phase I

Completed Technology Project (2014 - 2014)

Project Introduction

NASA has a critical requirement for a wearable device that can provide objective measures of sleep and activity for its crew during long duration spaceflight. In the proposed program, we will develop an unobtrusive wrist worn monitor that places minimum burden on the crew in operating the device. The device, once worn, requires no action from the crew and automatically records and analyzes actigraphy and sleep data. The device will have battery life of about one year and wireless data transfer so the crew will not be burdened with recharging the device and downloading data from the device. The monitoring device will provide real-time feedback on the level of activity and duration and quality of sleep. The proposed device is based on an existing sleep and activity monitor which we will modify and enhance to make it suitable for use in spaceflight environments. Data format, including epoch length and sleep statistics provided by the proposed system will conform to formats currently used in sleep research. In Phase 1, we will deliver a set of fully functional devices that can be deployed in spaceflight analogs. We will also perform feasibility studies of a Phase 2 unit, which will measure, in addition to sleep, activity and heart rate, other physiological parameters such as heart rate variability, blood pressure, vasoconstriction, pulsewave velocity, and electrodermal activity. Since the work is based on an existing sleep and activity monitoring platform, we expect that the Technology Readiness Level (TRL) of the Phase 1 unit to be at 7, and the Phase 2 unit to be at 8.

Primary U.S. Work Locations and Key Partners



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Organizations Performing Work	Role	Type	Location
Linea Research Corporation	Lead Organization	Industry	Palo Alto, California
Johnson Space Center(JSC)	Supporting Organization	NASA Center	Houston, Texas

Primary U.S. Work Locations	
California	Texas

Project Transitions

June 2014: Project Start

December 2014: Closed out

Closeout Summary: Wearable Device for Objective Sleep Monitoring, Phase I P roject Image

Closeout Documentation:

- Final Summary Chart Image*(https://techport.nasa.gov/file/137774)*

Images

Briefing Chart Image
Wearable Device for Objective Sleep Monitoring, Phase I
(https://techport.nasa.gov/image/126540)

Organizational Responsibility

Responsible Mission Directorate:
Space Technology Mission Directorate (STMD)

Lead Organization:
Linea Research Corporation

Responsible Program:
Small Business Innovation Research/Small Business Tech Transfer

Project Management

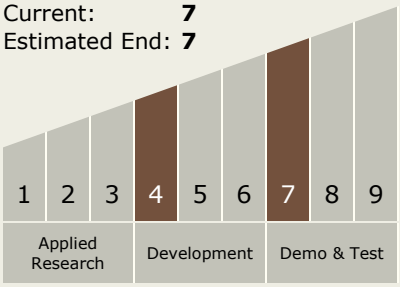
Program Director:
Jason L Kessler

Program Manager:
Carlos Torrez

Principal Investigator:
Yongjin Lee

Technology Maturity (TRL)

Start: **4**
Current: **7**
Estimated End: **7**



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Technology Areas

Primary:

- TX06 Human Health, Life Support, and Habitation Systems
  - TX06.3 Human Health and Performance
    - TX06.3.3 Behavioral Health and Performance

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System